## **MAT 246S**

- (1) Find the formula for the sum  $1 \cdot 2 2 \cdot 3 + 3 \cdot 4 \ldots + (2n-1) \cdot (2n) (2n) \cdot (2n+1)$ and prove it by mathematical induction.
- (2) Find the remainder when  $6^{100}$  is divided by 28.
- (3) Find the integer  $a, 0 \le a < 37$  such that  $(34!)a \equiv 1 \pmod{37}$ .
- (4) Let n = pq where p, q are distinct odd primes. Find the remainder when  $\phi(n)!$  is divided by n.
- (5) Find all integer solutions of the equation

$$34x + 50y = 22$$

(6) Let (a, m) = 1 Prove that for any c there exists b such that  $ab \equiv c \pmod{m}$ .